

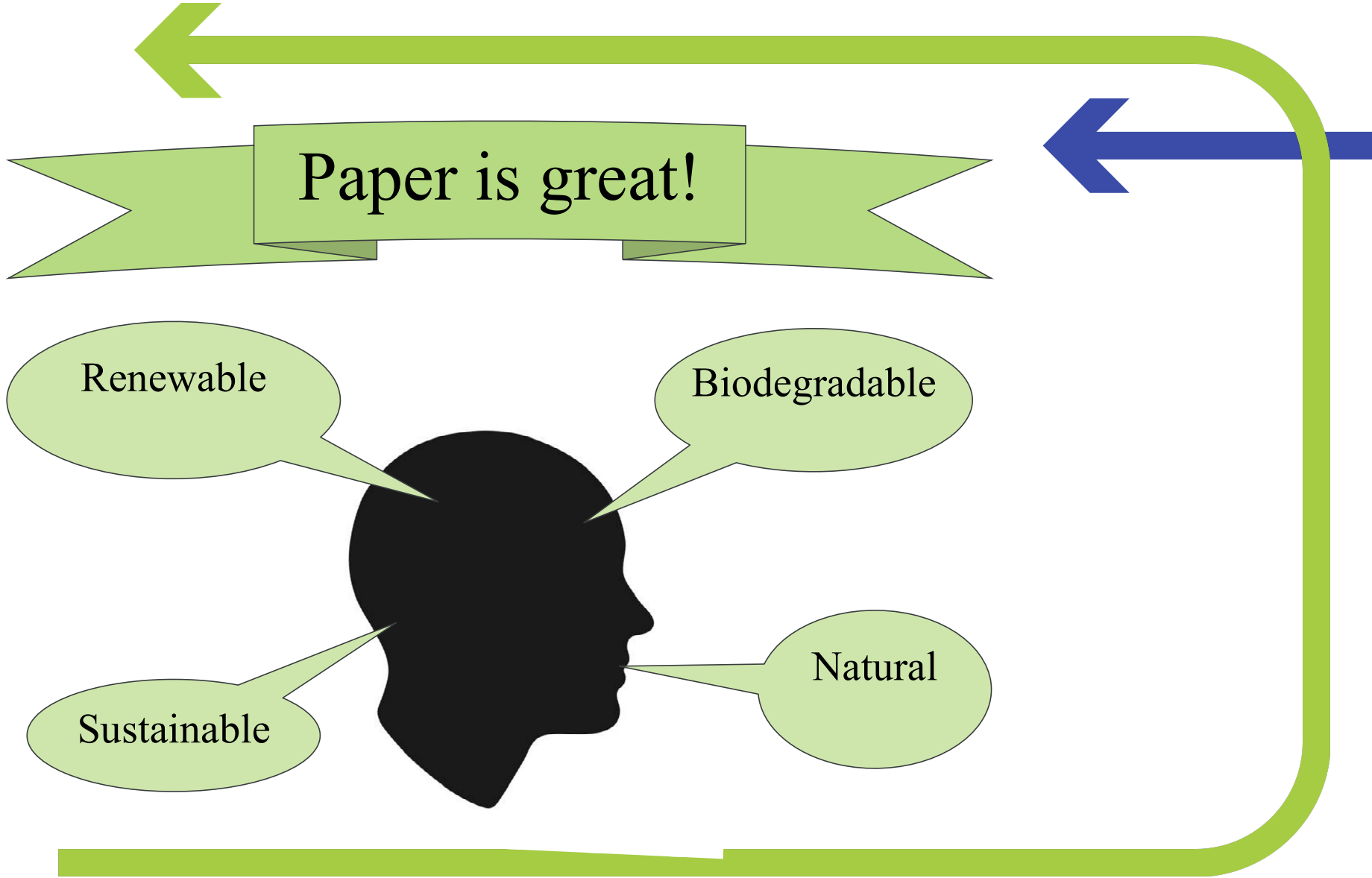
Transforming foundation Industries Research and Innovation Hub



Paper Working Group

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Date 12/6/24





7
cycles?

UK uses
68%
recycled
fibre



Swot analysis

Strength-opportunity:

- Market the use of paper and paper products as the replacement for single use plastics, especially in packaging

Weakness-opportunity:

- Marketing, education and training using modern media to promote markets and increase skill levels
- Clustering of other bioeconomy industries around plants to share capital on energy production and storage.

Strength-threat:

- Expand packaging to replace plastic with paper based products to replace sales lost to electronic media

Weakness-threat:

- Demonstrations of new technology
- Gain investment to set up new plants to supply local markets, reducing imports



Reality check!

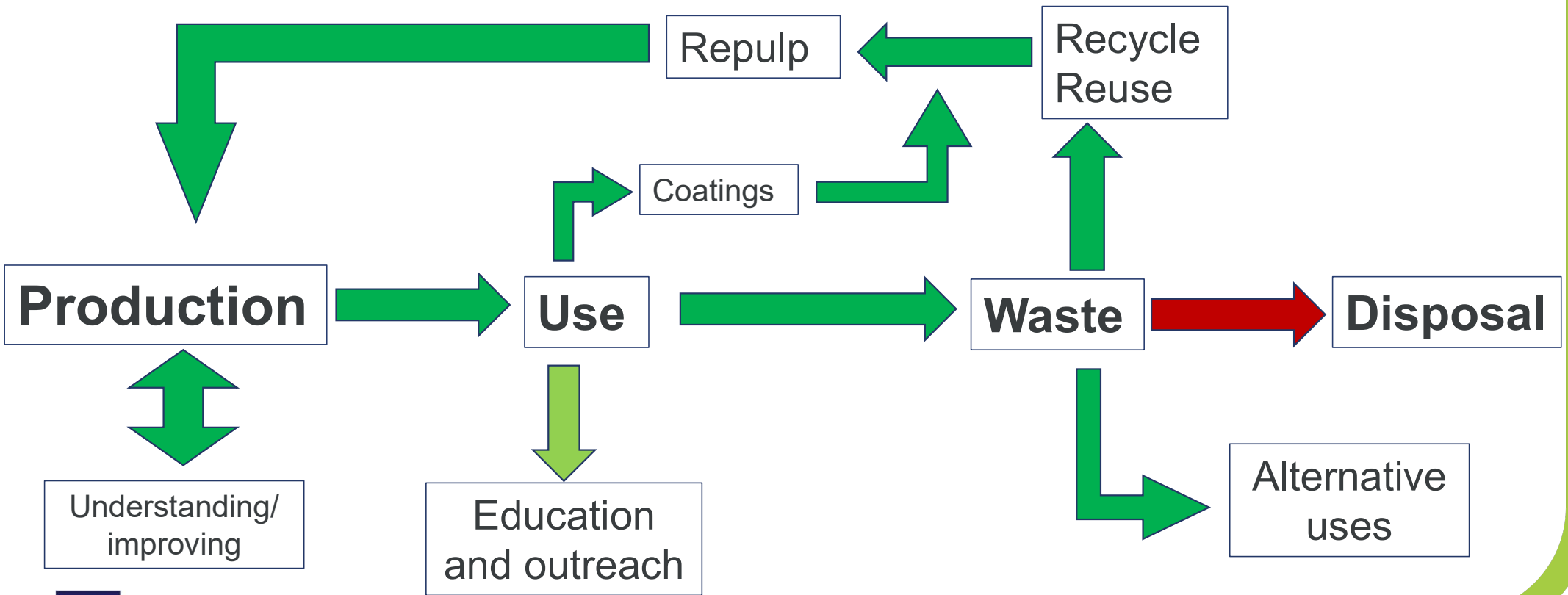
- High costs mean plants /mills aren't going to move
- New plants = high investment so unlikely in current conditions
- International ownership = international not local issues
- Although companies are open to innovation and initiatives ..



Good news

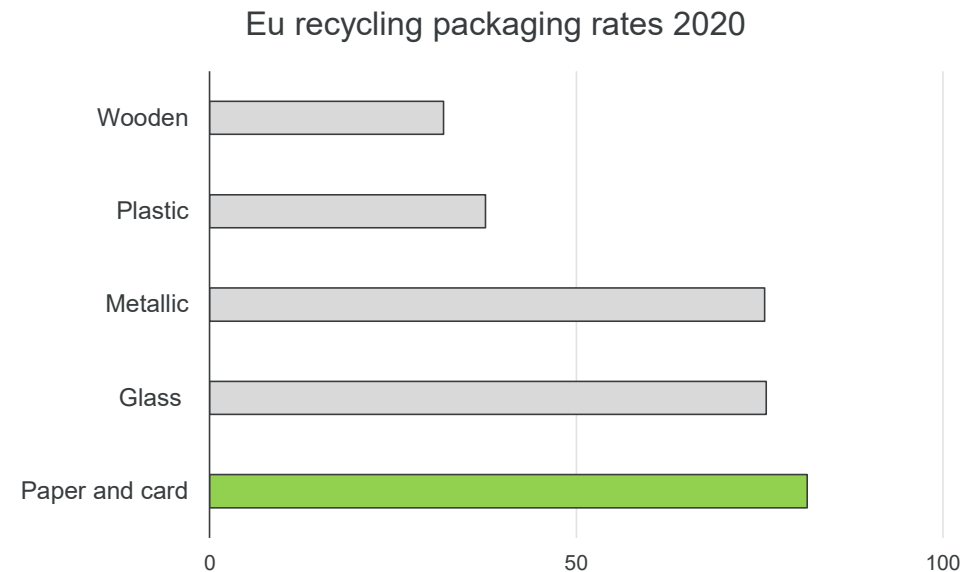
- Increase in packaging – online deliveries?
- New markets
- New products
- Make use of the positive attributes
- Paper better than plastic!

Transfire Pulp and Paper



Resource efficiency

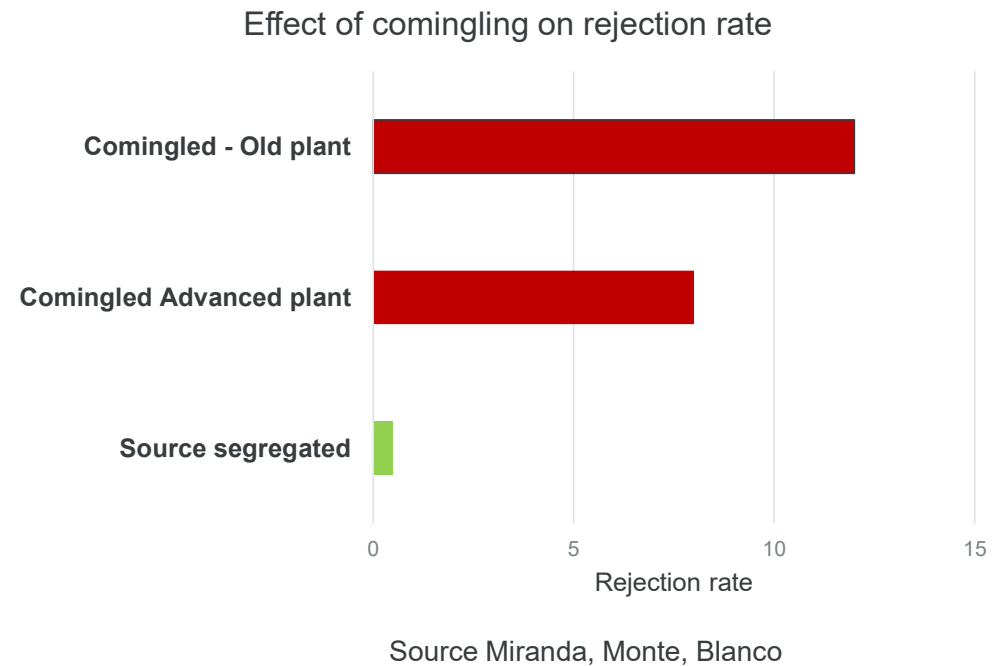
- Paper is biodegradable but in terms of resource efficiency reuse is better.
- Reuse via repulping established path
- UK could do better - 25th out of 30 European nations
- Recent DS Smith “Wasted Paper : A path to better recycling” shows decline in recycling across Europe
- UK rate could drop to 56% by 2030! Equivalent to 6.5 million tonnes





Why?

- Demographic differences?
- Not sorted properly?
- Contamination
 - Grease
 - Laminates e.g. cartons





Novel products

- Developments to address grease and water resistance.
- The development of the paper water bottle!

When is paper not paper?

- Great idea to replace plastic!
- But a paper bottle isn't always a paper bottle





Pulpex - Bangor

- “Full” paper bottle – biodegradable and repulpable!
- Bangor have worked with Pulpex to develop systems and test repulping
- Recent UKRI Project
 - **Bio-based feedstocks for bottle lid manufacturing (BioLids)**
Bangor University and Pulpex Limited
- Application in for method to address the fitments!





Coatings still required

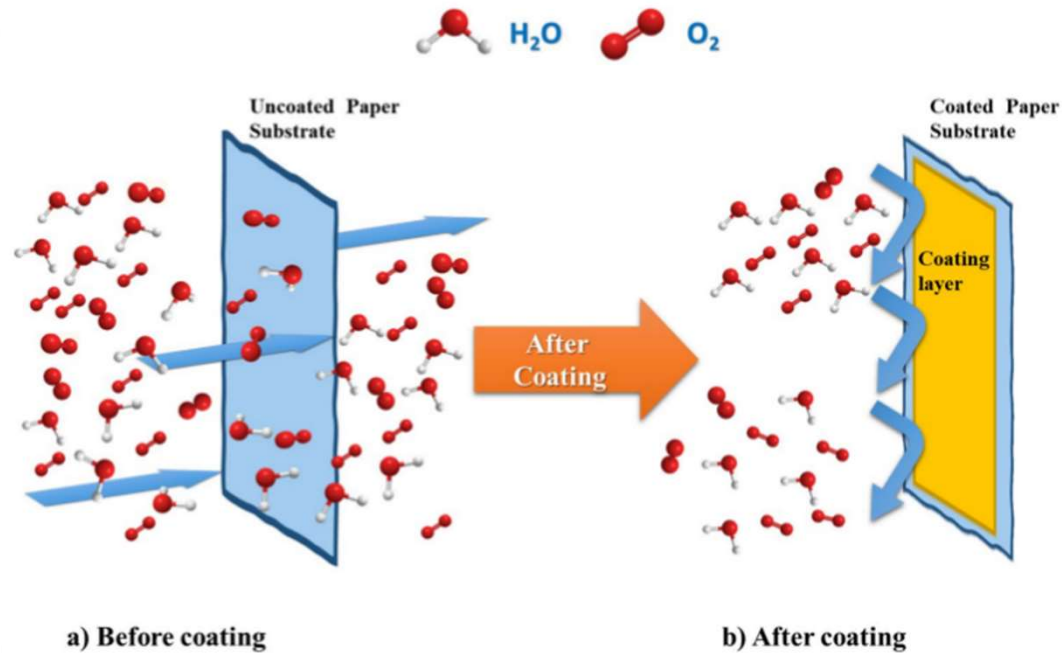
- For water and grease protection.
- Could be plastic film which has to be removed, or a laminate
- What about natural coatings?



Natural coatings

- Bangor have worked with Wipak Ltd to develop natural coatings
- Focus on barrier and mechanical properties
- Jennifer Woods PhD student (2nd year) (funded by Kess).

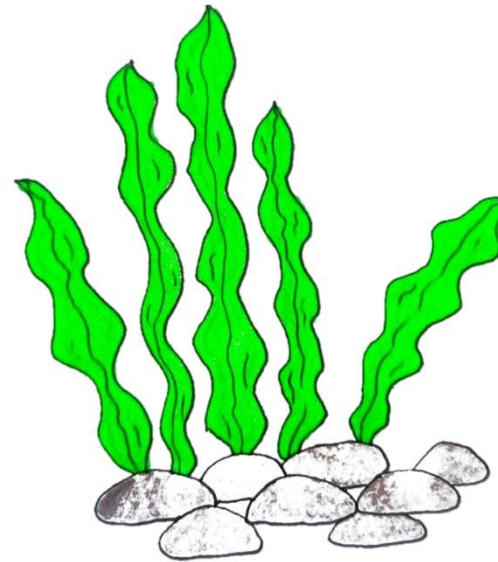
Improving barrier properties



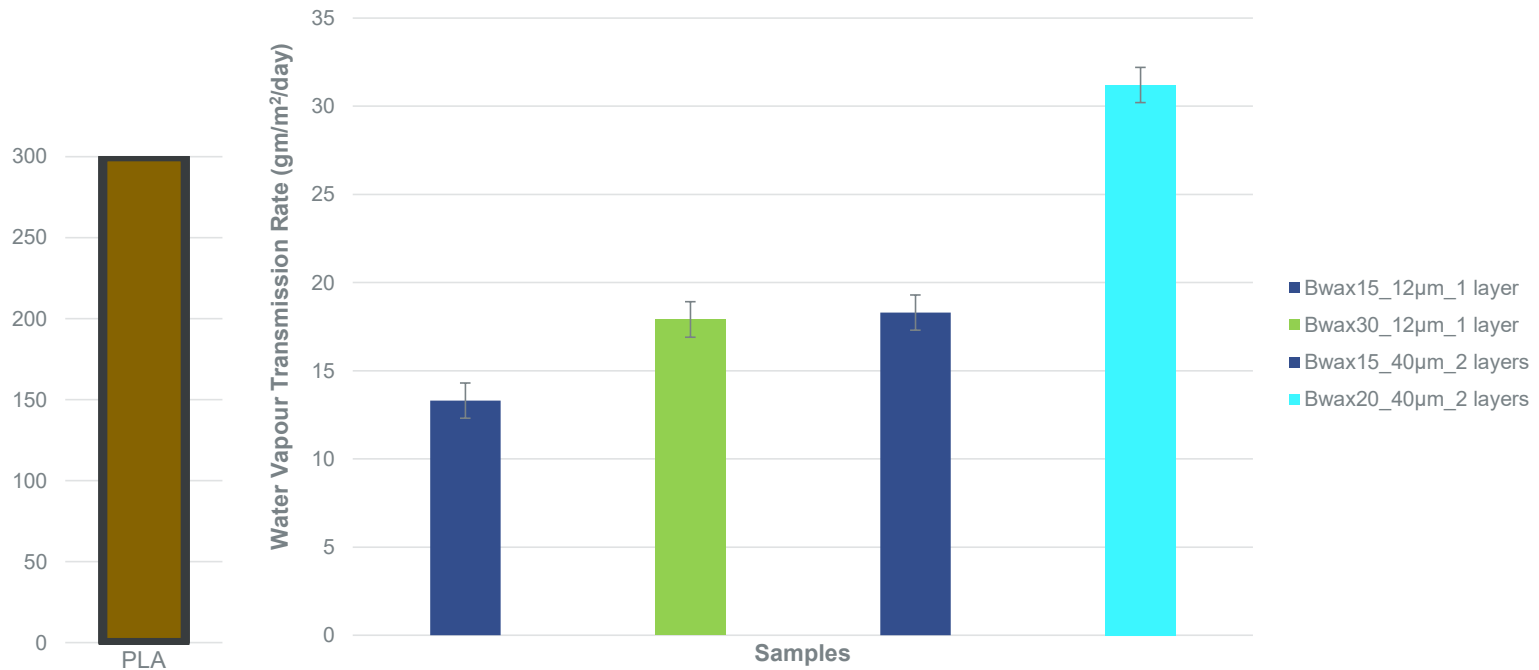
Kunam, P. K., Ramakanth, D., Konala, A., & Gaikwad, K. K. 2022. *The effect of coating on barrier properties*. ResearchGate. Available at: <https://www.researchgate.net/publication/363246328> Bio-based materials for barrier coatings on paper packaging. Accessed 22nd August 2023.



Why beeswax and seaweed?



Water barrier results

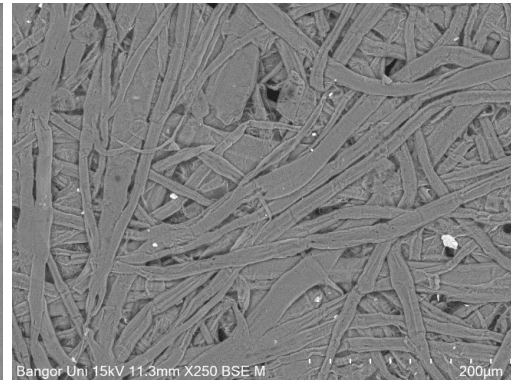
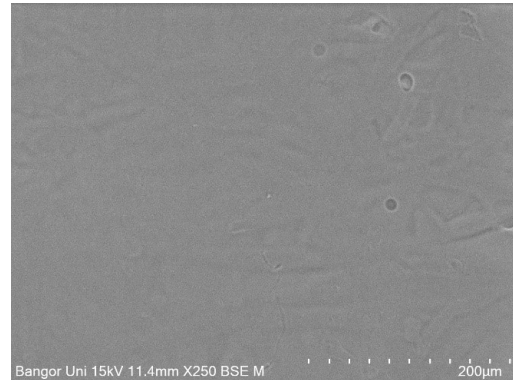
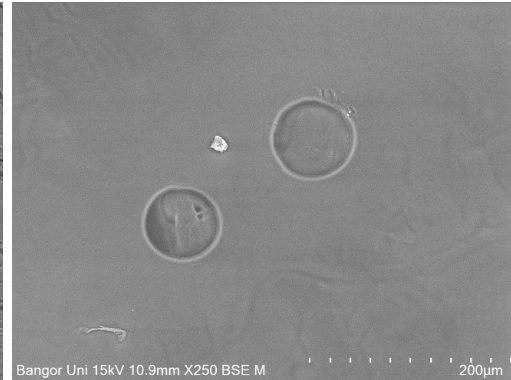
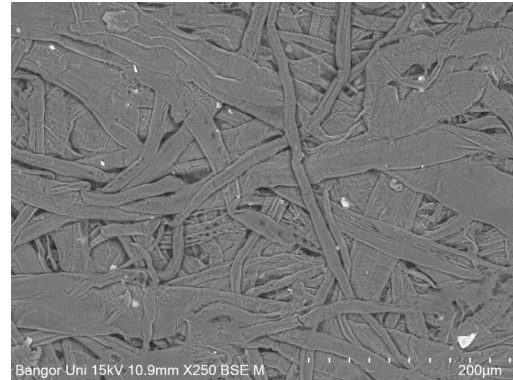


Wu, F., Misra, M. and Mohanty, A.K. (2021) Barrier Performance of Biodegradable Polymers, Progress in Polymer Science . Available at: https://www.researchgate.net/publication/351033209_Challenges_and_New_Opportunities_on_Barrier_Performance_of_Biodegradable_Polymers_for_Sustainable_Packaging (Accessed: 01 September 2023).



**Control
kraft**

**Kraft with
barrier
primer and
seaweed
coating**

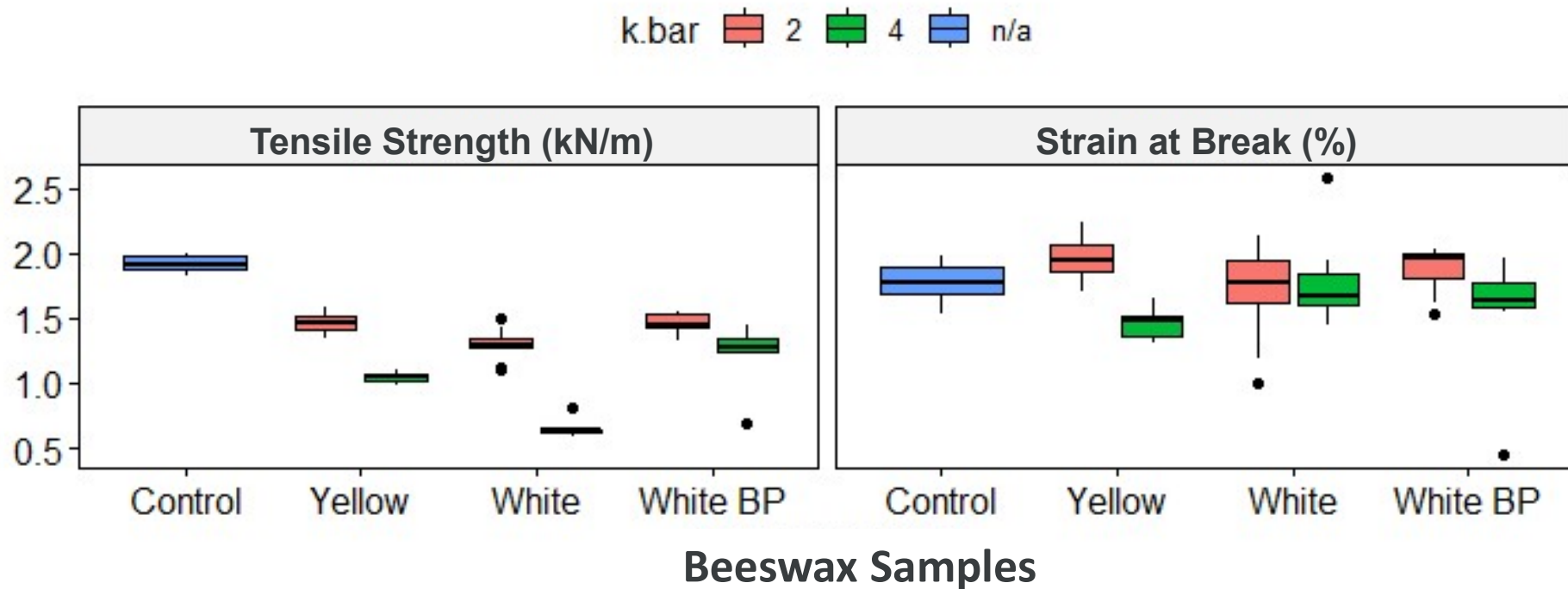


**Kraft
with
barrier
primer**

**Kraft
with
seaweed
coating**

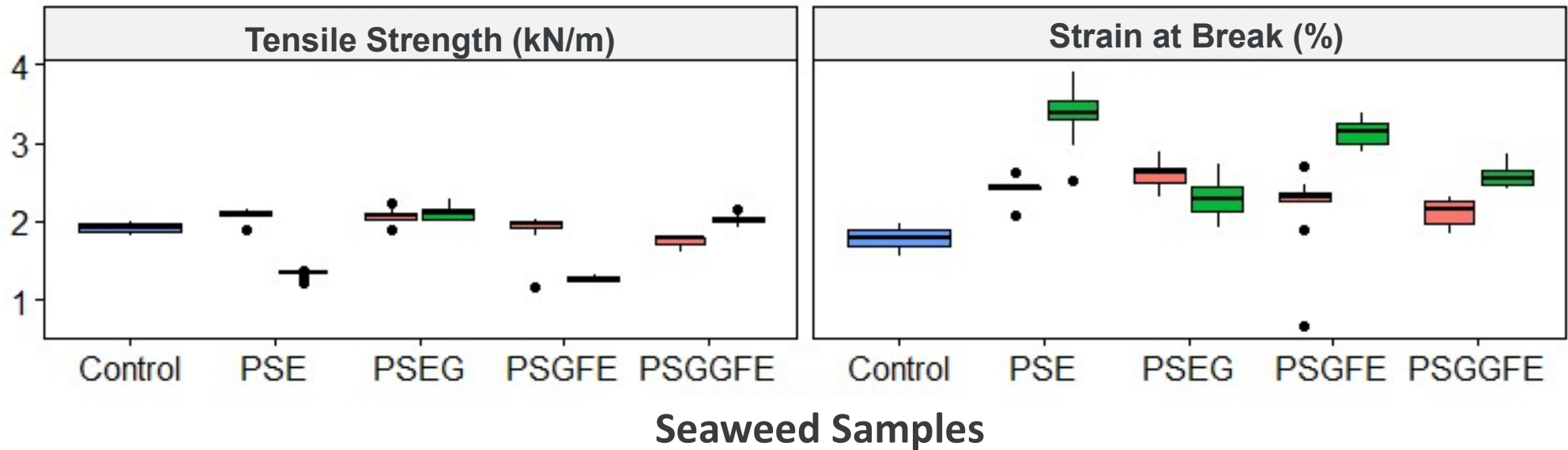


Beeswax tensile results



Seaweed tensile results

k.bar ■ 2 ■ 4 ■ n/a





Conclusions

- Natural coatings have great potential
- Different coating materials have differing properties and therefore potentially different uses.
- Lots more to be done!



And finally

- Resource efficiency of paper of prime importance
- Recycling and repulping are key current development areas
- Understanding the fundamentals of the materials and the processes will lead to Transformation.



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For further information:
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Thank you for
listening!

Any questions?